

REPAIR OF STARTING MOTORS 0 001 362 ..,  
 0 001 363 ..  
 and 9 000 143 .. (Type IF)  
 WITH INTERNAL AXIAL-PLAY COMPENSATION

Workshop: EL  
 05.1987  
 0007 En

The armatures 2 004 004 071.. 072 and .. 116 in these starting motors are no longer produced.

For repair, appropriate conversion parts are delivered together with the new armature in the parts set.

A list of the appropriate parts sets is given below.

Starting motor	Parts set
0 001 362 001 to .. 004 0 001 362 027 to .. 030	2 007 031 001
0 001 362 005 to .. 013 0 001 362 020 to .. 026 0 001 362 016 and .. 017 0 001 362 033 and .. 044	2 007 031 003
0 001 362 014 and .. 015	2 007 031 005
0 001 362 019	2 007 031 006
0 001 363 101 and .. 102	2 007 031 007
9 000 143 400 to .. 405 9 000 143 407 and .. 409	2 007 031 004
9 000 143 406	2 007 031 002

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 Division KH  
 Technical After-Sales Service (KH/VKD 2)

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EV STARTING MOTORS 0 001 218 ..

Workshop: EL  
05.1987

CHANGE IN DESIGNATION OF LUBRICATING GREASE

0009 En

The designation given in SIS microcard W-001/502 of the special lubricating grease for epicycloidal gear trains

5 899 907 318 (DOW Corning X5 - 7514)

has been changed to 5 984 610 120 (DOW Corning Q5 - 7514)

This lubricating grease is available from KH/ALP in 200 g tins under part number 5 984 610 120.

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ANTISKID SYSTEM (ABS) FOR COMMERCIAL VEHICLES

Workshop: EL  
07.1987

Service parts for commercial-vehicle ABS systems

0020 En

The following commercial-vehicle ABS service parts listed below can be ordered in the usual manner from KH/ALP:

Designation	Part number
Connecting line, semi-trailer (spiral cable)	2 264 462 317
Connecting cable, semi-trailer	2 264 462 318
Connecting cable, trailer	2 264 462 319
Parking-brake unit	2 264 484 301
ABS plug, complete	2 264 484 302
Contact-sleeve set *	2 267 010 303
ABS socket outlet, complete	2 264 484 303
Contact-pin set *	2 267 010 302
Pressure-regulating-valve plug, complete	2 264 484 304
Wheel-speed-sensor connector, complete	2 264 484 305
Clamping sleeve for wheel-speed sensor **	2 260 410 790
Intermediate housing	2 260 591 392
Key for control-unit box	2 262 092 300

\* Special tools are required to enable assembly in accordance with the generally recognized principles of engineering practice. For this purpose, see microcard NKW 006, Coordinate B20

\*\* Already included in the scope of delivery of the wheel-speed sensors 0 265 050 008 and .. 009.

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NEW PRODUCT

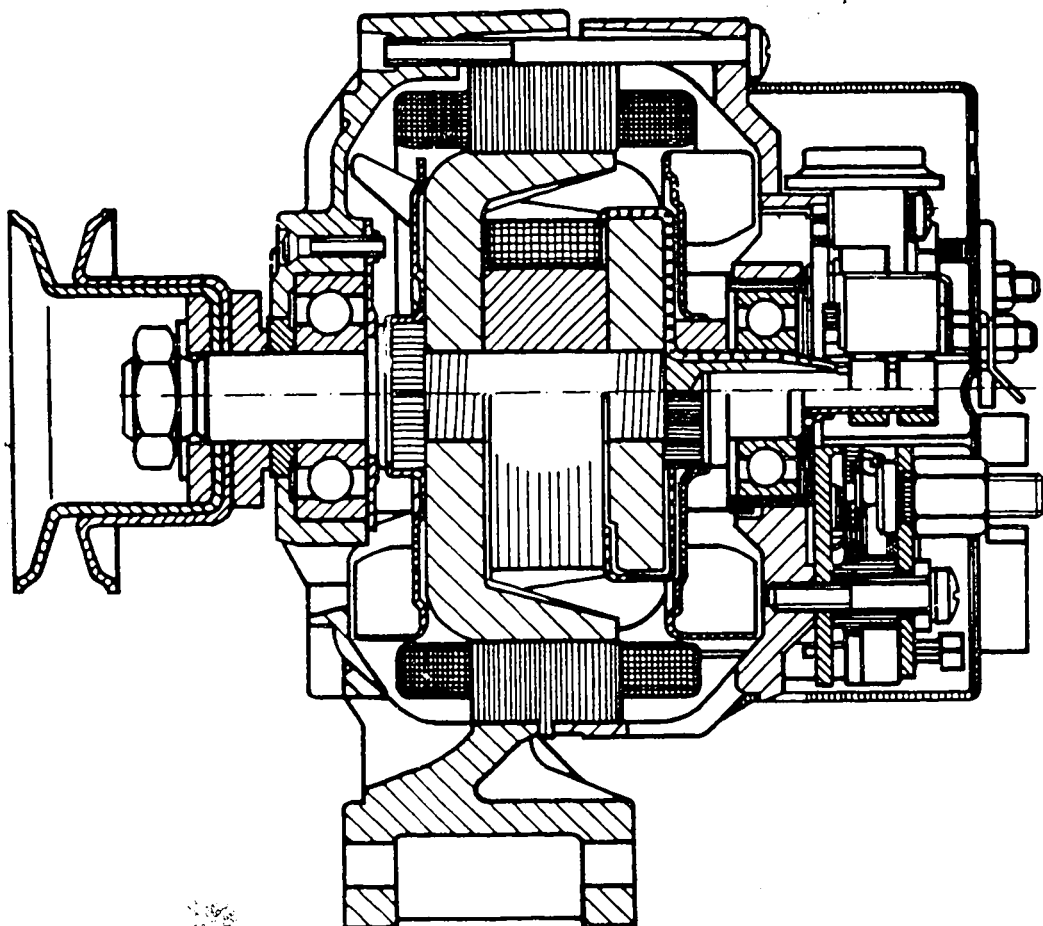
Workshop: EL  
07.1987

ALTERNATOR KK-14 V 28/70 A  
0 120 485..

0024 En

The KK alternator is a new conception from the BOSCH company,  
its first application being in the VW Passat Diesel since the  
end of 1986.

Sectional view of the alternator



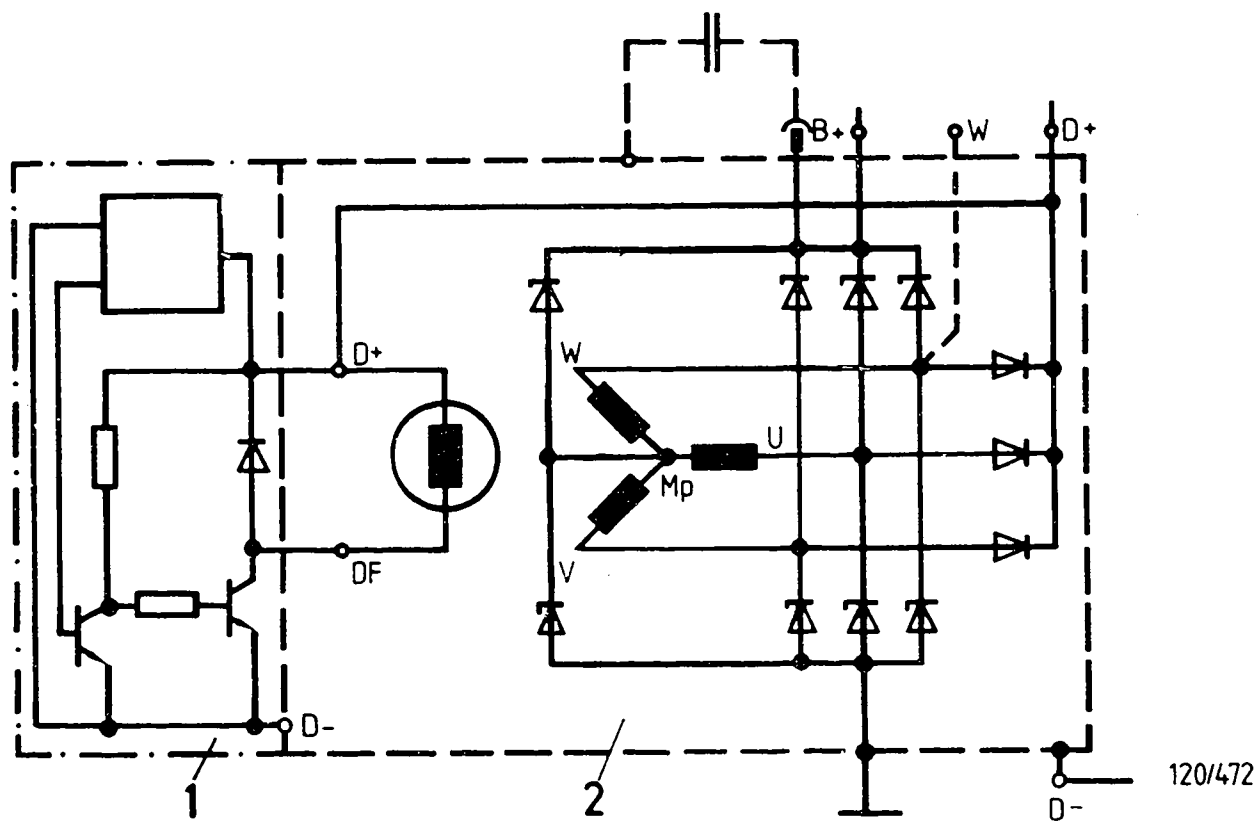
Construction:

12-pin synchronous generator with integral rectifier and 2 internally installed fans. Rectifiers in three-phase bridge circuit with power diodes or Zener diodes depending upon the type of regulator.

Sectional view of the alternator

1 = Monolithic regulator

2 = Alternator



## General :

The current to be supplied by the alternator together with information with regard to the course of the characteristic curve are apparent from the type designation:

The codes mean, e.g.: KK → 14V 28/70 A

K = Size of alternator  
K = Compact generator  
→ = Direction of rotation when looking at drive end  
14V = Rated voltage of alternator  
28/70A = Current at 1500 rpm. and current at rated speed (6000 rpm.)

The important special features of the alternator are:

- \* Ventilation, double-flow:  
From both sides of the alternator by 2 small internally installed fans at the end faces of the rotor.  
Air intake is axial and air output is radial, in each case, in the drive end shield and collector-ring end shield.
- \* 12 mm mini collector rings, externally fitted.  
Longer service life due to lower peripheral speed.
  
- \* Rectifier in sandwich design  
Rectifier is secured on the collector-ring end shield from outside.
- \* Monolithic regulator:  
Operates as EL regulator, however, surge-proof only up to 35 V.  
Therefore, use only in conjunction with Zener power diodes.
- \* End shield B with plastic cover:  
Perfect cooling of the alternator is guaranteed only if it is operated with protective cover fitted.
- \* Shaft with hexagon socket:  
For holding the rotor when loosening the pulley.

Operating conditions:

Operate the generator only with the regulator built on and with 12 V battery connected.

Pre-excitation is as before via a repeater lamp 12 V  $\geq$  2 W.

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STARTING MOTORS 0 001 410 .. TO 0 001 418 ..

Workshop: EL

Contact resistance at negative brush holders

09.1987

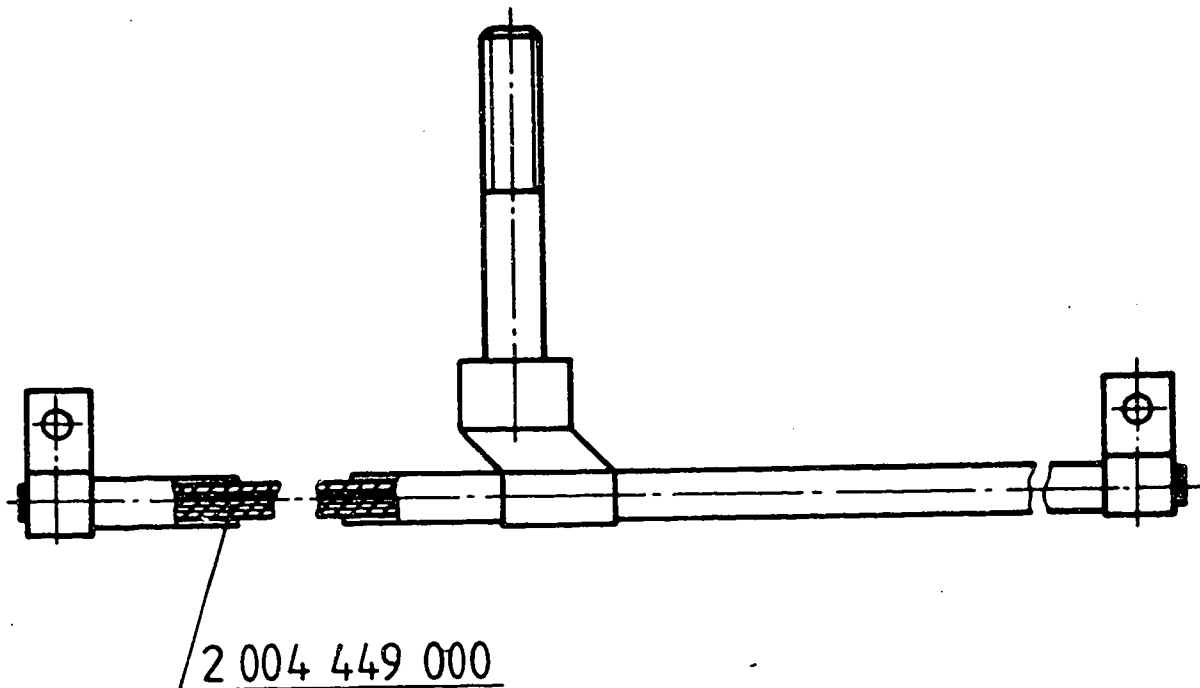
0040 En

If there is a complaint of loss of performance with these starting motors after a lengthy period of service, a contact resistance at the negative brush holders may be the cause.

From FD 541 onwards, the complaint no longer occurs because since then the contact areas on the commutator end shield have been milled.

The contact resistances can be identified by melting of the rivet heads of the negative brush holders. As a remedy, the commutator end shield can be replaced or the connecting cable 2 004 449 000 (figure) installed instead of the terminal stud.

Repairs must be paid for.



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Since the end of 1986, BOSCH has been manufacturing generators in which the rectifiers are equipped with Zener power diodes.

#### Function:

Zener power diodes are fitted in place of conventional power diodes in rectifiers of 3-phase alternating-current generators.

They have the characteristic of becoming conductive in the blocking direction as of a certain generator voltage and thus preventing the generator voltage from rising above for example 33 V (in the case of 14 V installations).

#### Scope of protection and advantages:

- \* Regulators and other electronic loads are protected against overvoltage.
- \* Vehicle electrical system
  - Limitation of generator voltage
  - Limitation of negative voltage peaks
  - Limitation of positive voltages from the vehicle electrical system

#### Testing rectifiers with Zener power diodes:

Generators with rectifiers equipped with Zener power diodes are identified with a "Z" in front of the last 4 digits of the rectifier part number (e.g. ..Z 0 803) as of mid-1987.

When testing these Zener diodes with the BOSCH generator tester WPG 012.00, it should be taken into account that in the "single diodes" switch position the reverse voltage of the Zener diodes of approx. 18 V is exceeded. As a result, the pointer remains in the red field even though the diode is in working order. When the diodes are tested in the wired-up state with stator winding connected, the reading is correct.

As of date of manufacture 744 (April 1987), the test voltage for alternator testers (WPG 012.00) has been reduced to the extent that the tester also gives a correct reading in the switch position "testing of single diodes".

Testers manufactured before April 1987 must be converted. The electrical components required for this are available at IA/PP, Part No. 1 687 001 187.

Conversion is not free of charge.

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DAMAGE TO STARTING MOTORS DUE TO CONTINUED  
ROTATION WITH THE ENGINE

Workshop: EL  
11.1987

Starting-motor series

0 001 1., 0 001 2., 0 001 3., and 0 001 42.

0044 En

1. Typical damage

- Commutator no longer correctly aligned
- Armature winding no longer correctly aligned
- Roller-type overrunning clutch blocked or no longer frictionally connecting
- Tarnishing on roller-type overrunning clutch due to overheating (exception: IE and KE with radial-tooth overrunning clutch)
  
- Pinion bushing worn
- Score marks on armature shaft due to pinion bushing
- Pinion teeth scored

2. Possible causes

- Fault at solenoid switch, e.g. interturn short circuit in the holding winding or pull-in winding or mechanically jammed (foreign body etc.).  
Testing the solenoid switch for winding faults:  
Apply twice nominal voltage, but in the case of 24 V solenoid switch max. 36 V only, between terminal stud 30 and switch housing. Then push in armature to the stop.

The solenoid switch has an interturn short circuit if the armature does not return to its idle position correctly when released.

- Permanent or occasional locking/catching of starting switch.  
Possible causes: soiling, foreign bodies, water damage, mechanical damage, manufacturing error etc.
  
- Operating fault: starting motor remains switched on via the starting switch after the engine has started.
  
- Fault in the wiring (connection between leads 50 and 30 or 50 and 15a).

### 3. Effects

In all of the described cases, the starting-motor pinion remains engaged with the engine ring gear. Depending on engine speed and the transmission ratio between the starting-motor pinion and the engine ring gear, as well as the engagement time, the following damage sequence results:

The grease in the roller-type overrunning clutch is overstrained and becomes decomposed as a result of the large relative movements occurring and the ensuing excessive temperatures (does not affect KE starting motors with radial-tooth overrunning clutch).

The reduced lubricity results in a further increase in temperature. The overrunning clutch is frequently firmly overstressed until tarnishing colors are formed.

The overloading leads to grinding marks in the overrunning clutch and flattening of the rollers; the roller preloading springs become set. The rotational speed of the armature constantly increases with the overrunning torque of the overstressed overrunning clutch, until finally the armature reaches overspeed. Parts of the misaligned commutator and/or the armature winding block the armature, thus forcing out the starting-motor pinion/drive from the engine ring gear via the spiral spline, even when the solenoid switch is switched on. The pinion teeth rattle past the ring gear; depending on the timing sequence, individual teeth of the starting-motor pinion may be scored or completely worn down. Findings of this type provide clear indication of the possible faults described above.

Certain proof of a solenoid switch being energized for too long is also given by discoloration of the paper insulation between the holding winding and the pull-in winding. Discoloration does not occur until after an uninterrupted on period of several minutes.

### 4. Warranty regulations

An application under warranty is only justified if a manufacturing or material fault is to be found in BOSCH parts and the warranty period has not yet expired.

The most significant feature in deciding on warranty is the test of the solenoid switch described under Item 2. If the cause of failure is established as being a fault in the solenoid switch, the starting motor must be sent in.

In the Federal Republic of Germany:

ROBERT BOSCH GmbH  
Abteilung K9/VAK  
Robert-Bosch-Straße  
7141 Schwieberdingen

In all other countries, to the national BOSCH agency.

If there is a fault in a BOSCH starting switch, please then also send in the starting switch and starting motor as consequential damage.

In the Federal Republic of Germany to:

ROBERT BOSCH GmbH  
Abteilung K1/VAK3  
Zweibrückener Straße 13  
8500 Nürnberg

In all other countries, to the national BOSCH agency.

If any other cause is established, claims under warranty against BOSCH are not justified.

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Division KH  
Technical After-Sales Service (KH/VKD 2)

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LOCATIONS: UNIVERSAL TEST STATIONS  
IN WEST GERMANY

Workshop: EL  
02.1988

BOSCH WHOLESALERS

Location

BG (BE/VH)

Aachen	Schmitz
Albstadt 1	Lorch
Aschaffenburg	Wissel
Augsburg	Dürr
Bayreuth 2	Knoll
Berlin 12	Verkaufshaus BE/VT5
Bielefeld 1	Kalveram
Bochum-Harpen	Boesner
Bonn	Hüller & Brunn
Bremen 1	Fa. Fa. Seelig GmbH
Stresemannstr. 50	
Bremerhaven 1	Janssen
Darmstadt	Strobl
Dortmund	Boss
Düsseldorf	Soeffing
Essen 1	Wagener & Schade
Flensburg	Stegner & Grundner
Frankfurt / Main 90	Schmitt
Freiburg / Breisgau	Keller & Schneider
Gießen	Fetzer
Hamburg 26	Kruse
Hamburg 90	Zöger
Hannover 1	Maurer
Heilbronn	Dieterich
Höchberg-Würzburg	Schlag
Ingolstadt	Müller
Kaiserslautern	Henn
Karlsruhe 21	Karrer & Barth
Kassel - Waldau	Wagner
Kiel 14	Droege
Koblenz	Scherer
Köln 30	Neuerburg
Krefeld 1	Schwacke
Landshut 1. Bay.	Käufel
Lübeck 1	Schöberl Lübeck



BOSCH WHOLESALERS (CONTINUED)

Location

BG

Location	BG
Lüdenscheid	Schöneborn
Mannheim 31	Kocher
München 45	Meinburk, Meineke
Münster	Coler
Neuötting	Leitl
Neu-Ulm	Lipp
Nürnberg 10	Koller & Schwemmer
Oldenburg / Old.	Kickler
Osnabrück	Haug
Passau	Müller
Regensburg	Schmidt

Remscheid	Klaiss
Reutlingen 1	Gokenbach
Rheine / Westf.	Klaps
Rottweil-Altstadt	Huber
Saarbrücken 3	Lichius
Schweinfurt a. M.	Mezger
Siegen 1	Römer
Straubing	Pregler
Stuttgart 60	Trost
Trier	Weiler
Weiden 2	Küblbeck
Wiesbaden-Biebrich	Schäufele

Location

BD

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Aichelberg  
Bad Neustadt / S.  
Bad Säckingen  
Bamberg  
Bocholt  
Brekium  
Celle  
Dortmund  
Ehingen

Straub  
Endrich  
Weber  
Engert  
Degeling  
Hörcher  
Wolf  
Völkmann  
Radi

Haßfurt  
Helmstedt  
Iserlohn  
Kaiserslautern  
Lage  
Lebach  
Lohne  
Ludwigsburg  
Maxdorf  
Neuwied  
Nürnberg  
Oberkottzau  
Osnabrück  
Remscheid  
Rheinfelden

Betz  
Ranft  
Wessalowski  
Müller  
Büker  
Weber  
Südbeck  
Sulzberger  
Wiebelskircher  
Vogtmann-Herold  
Schmidt  
Böhringer  
Hartlage  
Richter  
Niethammer

Stuttgart 80  
Trier  
Ulm  
Wuppertal  
Wuppertal

Gebert  
Dorner & Volbach  
Mack  
Friedrichs  
Hauptmann

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INDEX OF THE SWITCHGEARS, CONTROL UNITS AND  
 CONTROLLERS TESTABLE ON THE UNIVERSAL TEST  
 STATION WITH TESTING TIMES IN WORK UNITS (WU)

Workshop: EL  
 02.1988

0053 De

The switchgears, control units and controllers listed below are those which can presently be tested on a universal test station. They are arranged in ascending order of type part number per system.

The testing times given comprise the complete execution of a component test on the universal test station, including set-up time, wiring up, setting the testing and measuring equipment, conducting all the test steps, and clearing away after testing. The testing times have been determined by means of time and motion studies and are stated in work units (WUs) of 6 minutes.

Type Part Number	System	Manufacturer	Testing time (WU)
1 147 328 001	Duo Heatmatic	DB	5
1 147 328 002	Duo Heatmatic	DB	5
1 147 328 007	Duo Heatmatic	DB	5
1 147 328 008	Duo Heatmatic	DB	5
1 147 328 040	Duo Heatmatic	DB	5
1 147 328 500	Duo Heatmatic	DB	5
1 147 328 501	Duo Heatmatic	DB	5
1 147 328 511	Duo Heatmatic	DB	5
1 147 328 512	Duo Heatmatic	DB	5
1 147 328 004	Blower regulator	DB	5
1 147 328 010	Blower regulator	DB	5
1 147 328 026	Blower regulator	DB	5
1 147 328 029	Blower regulator	DB	5
1 147 328 011	Air-conditioning control	BMW	4
1 147 328 033	Air-conditioning control	Citroen	5
1 147 328 036	Air-conditioning control	BMW	4

Type Part Number	System	Manufacturer	Testing time (WU)
1 147 328 044	Air-conditioning control	DB	5
1 147 328 052	Air-conditioning control	BMW	4
1 147 328 058	Air-conditioning control	Citroen	5
1 147 328 012	Air conditioner	BMW	4
1 147 328 037	Air conditioner	Volvo	5
1 147 328 053	Air conditioner	BMW	4
1 147 328 064	Air conditioner	BMW	4
1 147 328 065	Air conditioner	Porsche	4
1 147 328 502	Tempmatic op. element	DB	4
1 147 328 019	Tempmatic	DB	5
1 147 328 020	Tempmatic	DB	5
1 147 328 030	Tempmatic	DB	5
1 147 328 031	Tempmatic	DB	5
1 147 328 038	Tempmatic	DB	5
1 147 328 039	Tempmatic	DB	5
1 147 328 043	Tempmatic	DB	6
1 147 328 061	Tempmatic	DB	6
0 192 032 ..	Generator regulator	various	3
0 192 033 ..	(Transistor regulator)	passenger cars	3
0 192 062 ..	for alternators	and commercial	3
0 192 083 ..		vehicles	3
0 221 600 050	TI	Audi	4
0 221 600 053	TI	Opel	4
0 221 600 054	TI	Alfa Romeo	4
0 227 100 023	TCI-I	DB	4
0 227 100 042	TCI-I	DB	4
0 227 100 100	TI-H	VW	4
0 227 100 102	TI-I	BMW, Peugeot	4
0 227 100 103	TI-H	Audi	4
0 227 100 105	TI-I	Ford	4
0 227 100 111	TI-I	Alfa, BMW, Peug.	4
0 227 100 113	TI-H	BMW	4
0 227 100 114	TI-I	DB	4
0 227 100 116	TI-H	BMW	4
0 227 100 118	TI-H	Saab, Volvo	4

Type part number	System	Manufacturer	Testing time (WU)
0 227 100 121	TI-I	DB	4
0 227 100 123	TI-I	Citroen, Peugeot	4
0 227 100 124	TI-I	Porsche	4
0 227 100 128	TI-I	RBAU	4
0 227 100 137	TI-H	Audi, VW	4
0 227 100 139	TI-H	Saab, Volvo	4
0 227 100 140	TI-I	Peugeot	4
0 227 100 142	TI-H	VW	4
1 227 022 001	TI-I	Ford	4
1 227 022 003	TI-I	Ford	4
1 227 022 008	TI-H	Opel, Seat	4
1 227 022 017	TI-I	Ford	4
1 227 022 018	TI-I	Ford	4
0 280 000 300	LE-Jetronic	Citroen	9
0 280 000 301	LE-Jetronic	Opel	9
0 280 000 302	LE-Jetronic	Opel	9
0 280 000 304	LE-Jetronic	Opel	9
0 280 000 305	LE-Jetronic	Opel	9
0 280 000 306	LE-Jetronic	Opel	9
0 280 000 307	LE-Jetronic	Opel	9
0 280 000 308	LE-Jetronic	Volvo	9
0 280 000 309	LE-Jetronic	Fiat	9
0 280 000 313	LE-Jetronic	BMW	9
0 280 000 318	LE-Jetronic	BMW	9
0 280 000 319	LE-Jetronic	Peugeot	9
0 280 000 321	LE-Jetronic	Peugeot	9
0 280 000 324	LE-Jetronic	Lancia	9
0 280 000 326	LE-Jetronic	Opel	9
0 280 000 327	LE-Jetronic	Opel	9
0 280 000 330	LE-Jetronic	BMW	9
0 280 000 331	LE-Jetronic	GM- Holden	9
0 280 000 333	LE-Jetronic	Peugeot	9
0 280 000 336	LE-Jetronic	Fiat	9
0 280 000 337	LE-Jetronic	Seat	9
0 280 000 338	LE-Jetronic	Opel	9

Type part number	System	Manufacturer	Testing time (WU)
0 280 000 339	LE-Jetronic	Opel	9
0 280 000 340	LE-Jetronic	Peugeot	9
0 280 001 300	LE-Jetronic	BMW	9
0 280 001 301	LE-Jetronic	BMW	9
0 280 001 302	LE-Jetronic	Opel	9
0 280 001 303	LE-Jetronic	Opel	9
0 280 001 305	LE-Jetronic	GM-Holden	9
0 280 001 306	LE-Jetronic	Opel	9
0 280 001 307	LE-Jetronic	Opel	9
0 280 001 308	LE-Jetronic	BMW	9
0 280 001 310	LE-Jetronic	BMW	9
0 280 001 314	LE-Jetronic	Opel	9
0 280 001 315	LE-Jetronic	Opel	9
0 280 000 503	LH-Jetronic	Volvo	9
0 280 000 510	LH-Jetronic	Volvo	9
0 280 000 511	LH-Jetronic	Volvo	9
0 280 000 517	LH-Jetronic	Saab	9
0 280 000 518	LH-Jetronic	Volvo	9
0 280 000 519	LH-Jetronic	Saab	9
0 280 000 521	LH-Jetronic	Saab	9
0 280 000 530	LH-Jetronic	Saab	9
0 280 000 531	LH-Jetronic	Saab	9
0 280 000 532	LH-Jetronic	Saab	9
0 280 000 534	LH-Jetronic	Saab	9
0 280 000 538	LH-Jetronic	Saab	9
0 280 000 539	LH-Jetronic	Saab	9
0 280 000 540	LH-Jetronic	Saab	9
0 280 000 541	LH-Jetronic	Volvo	9
0 280 000 544	LH-Jetronic	Volvo	9
0 280 000 550	LH-Jetronic	Volvo	9
0 280 001 506	LH-Jetronic	Peugeot	9
0 280 001 507	LH-Jetronic	Peugeot	9
0 280 002 501	LH-Jetronic	Porsche	9
0 280 002 503	LH-Jetronic	Porsche	9
0 280 000 303	LU-Jetronic	Renault	9
0 280 000 310	LU-Jetronic	BMW	9
0 280 000 317	LU-Jetronic	Renault	9
0 280 000 322	LU-Jetronic	Peugeot	9
0 280 000 323	LU-Jetronic	Peugeot	9
0 280 000 328	LU-Jetronic	BMW	9
0 280 000 334	LU-Jetronic	Opel	9
0 280 000 335	LU-Jetronic	Opel	9

Type part number	System	Manufacturer	Testing time (WU)
0 280 000 343	LU-Jetronic	Peugeot	9
0 280 000 344	LU-Jetronic	Peugeot	9
0 280 000 345	LU-Jetronic	Peugeot	9
0 280 000 346	LU-Jetronic	Volvo	9
0 280 140 ..	Idle actuator	Various	1
0 280 215 ..	Self-cleaning module	Various	4
0 280 800 060	K-Jetronic	Audi	4
0 280 800 061	K-Jetronic	Audi	4
0 280 800 064	K-Jetronic	Porsche	4
0 280 800 067	K-Jetronic	Renault	4
0 280 800 070	K-Jetronic	Saab	4
0 280 800 100	KE-Jetronic	DB	5
0 280 800 101	KE-Jetronic	DB	5
0 280 800 102	KE-Jetronic	DB	5
0 280 800 103	KE-Jetronic	DB	5
0 280 800 104	KE-Jetronic	Audi	5
0 280 800 105	KE-Jetronic	Audi	5
0 280 800 106	KE-Jetronic	Audi	5
0 280 800 107	KE-Jetronic	Audi	5
0 280 800 108	KE-Jetronic	DB	5
0 280 800 109	KE-Jetronic	DB	5
0 280 800 116	KE-Jetronic	DB	9
0 280 800 117	KE-Jetronic	DB	9
0 280 800 118	KE-Jetronic	DB	9
0 280 800 119	KE-Jetronic	DB	9
0 280 800 120	KE-Jetronic	DB	9
0 280 800 121	KE-Jetronic	DB	9
0 280 800 122	KE-Jetronic	DB	9
0 280 800 123	KE-Jetronic	DB	9
0 280 800 124	KE-Jetronic	DB	5
0 280 800 125	KE-Jetronic	DB	5
0 280 800 128	KE-Jetronic	Audi	5
0 280 800 129	KE-Jetronic	Audi	5
0 280 800 134	KE-Jetronic	Audi	5
0 280 800 135	KE-Jetronic	Audi	5
0 280 800 136	KE-Jetronic	DB	5
0 280 800 137	KE-Jetronic	DB	5
0 280 800 140	KE-Jetronic	Audi	5

Type part number	System	Manufacturer	Testing time (WU)
0 280 800 141	KE-Jetronic	Audi	5
0 280 800 144	KE-Jetronic	Ferrari	5
0 280 800 152	KE-Jetronic	DB	9
0 280 800 153	KE-Jetronic	DB	9
0 280 800 160	KE-Jetronic	DB	9
0 280 800 161	KE-Jetronic	DB	9
0 280 800 178	KE-Jetronic	DB	9
0 280 800 179	KE-Jetronic	DB	9
0 280 800 204	KE-Jetronic	DB	5
0 280 800 205	KE-Jetronic	DB	5
0 280 800 206	KE-Jetronic	DB	5
0 280 800 207	KE-Jetronic	DB	5
0 280 800 210	KE-Jetronic	DB	9
0 280 800 211	KE-Jetronic	DB	9
0 280 800 220	KE-Jetronic	DB	9
0 280 800 221	KE-Jetronic	DB	9
0 280 800 226	KE-Jetronic	DB	9
0 280 800 227	KE-Jetronic	DB	9
0 285 001 050	Seat-belt tensioner	DB	3
0 285 001 051	Seat-belt tensioner	Saab	3
0 285 001 052	Seat-belt tensioner	Volvo	3
0 260 200 002	Ecotronic	BMW	10
0 260 200 003	Ecotronic	Opel	10
0 260 200 005	Ecotronic	BMW	10
0 285 007 001	Ecotronic	VW	10
0 285 007 002	Ecotronic	VW	10
0 280 800 116	KE-Jetronic	DB	9
0 280 800 117	KE-Jetronic	DB	9
0 280 800 118	KE-Jetronic	DB	9
0 280 800 119	KE-Jetronic	DB	9
0 280 800 120	KE-Jetronic	DB	9
0 280 800 121	KE-Jetronic	DB	9
0 280 800 122	KE-Jetronic	DB	9
0 280 800 123	KE-Jetronic	DB	9
0 280 800 124	KE-Jetronic	DB	5
0 280 800 125	KE-Jetronic	DB	5
0 280 800 128	KE-Jetronic	Audi	5
0 280 800 129	KE-Jetronic	Audi	5
0 280 800 134	KE-Jetronic	Audi	5



Type part number	System	Manufacturer	Testing time (WU)
0 280 800 135	KE-Jetronic	Audi	5
0 280 800 136	KE-Jetronic	DB	5
0 280 800 137	KE-Jetronic	DB	5
0 280 800 140	KE-Jetronic	Audi	5
0 280 800 141	KE-Jetronic	Audi	5
0 280 800 144	KE-Jetronic	Ferrari	5
0 280 800 152	KE-Jetronic	DB	9
0 280 800 153	KE-Jetronic	DB	9
0 280 800 160	KE-Jetronic	DB	9
0 280 800 161	KE-Jetronic	DB	9
0 280 800 178	KE-Jetronic	DB	9
0 280 800 179	KE-Jetronic	DB	9
0 280 800 204	KE-Jetronic	DB	5
0 280 800 205	KE-Jetronic	DB	5
0 280 800 206	KE-Jetronic	DB	5
0 280 800 207	KE-Jetronic	DB	5
0 280 800 210	KE-Jetronic	DB	9
0 280 800 211	KE-Jetronic	DB	9
0 280 800 220	KE-Jetronic	DB	9
0 280 800 221	KE-Jetronic	DB	9
0 280 800 226	KE-Jetronic	DB	9
0 280 800 227	KE-Jetronic	DB	9
0 285 001 050	Seat-belt tensioner	DB	3
0 285 001 051	Seat-belt tensioner	Saab	3
0 285 001 052	Seat-belt tensioner	Volvo	3
0 260 200 002	Ecotronic	BMW	10
0 260 200 003	Ecotronic	Opel	10
0 260 200 005	Ecotronic	BMW	10
0 285 007 001	Ecotronic	VW	10
0 285 007 002	Ecotronic	VW	10
0 285 007 003	Ecotronic	DB	10
0 285 007 004	Ecotronic	DB	10
0 285 007 010	Ecotronic	DB	10
0 285 007 011	Ecotronic	DB	10
0 331 801 300	Start-locking relay	DB	3

Type part number	System	Manufacturer	Testing time (WU)
0 335 411 005	Tone-seq. control device	KH	4
0 335 411 006	Tone-seq. control device	KH	4
0 335 411 015	Tone-seq. control device	KH	4
0 335 411 016	Tone-seq. control device	KH	4
0 335 411 017	Car Alarm I	KH	4
0 335 411 027	Car Alarm I	KH	4
0 335 411 010	Car Alarm II	KH	4
0 335 411 013	Car Alarm II	KH	4
0 335 411 029	Car Alarm II	KH	4
0 335 411 014	Car Alarm plus 3	KH	4
0 335 411 023	Car Alarm plus 3	KH	4
0 335 520 101	Angle sensor	KH	2
0 335 520 105	Angle sensor	KH	2
0 986 335 002	Car Alarm plus 4	KH	4
0 986 335 009	Car Alarm plus 4	KH	4

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Division KH  
After-Sales Service Department for  
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concerning the contents to our authorized  
representative in your country.

Frequent response

0075 En

Reports are always being received about "unjustified" response of the unit in vehicles with over-current protection S 28 V - 0 192 900 004, ie. the alternator is deenergized although there is no fault in the electrical system. This is caused by the extremely short delay time of the ÜSG which is insufficient for certain battery statuses and installations and thus causes the unit to respond in the event of inductive voltage peaks or very brief changes in load.

As the engine has to be turned off and the driving switch switched off in order to put the alternator back into operation, a frequent practice is to detach the connector from the ÜSG and thus disconnect the unit. In such cases the envisaged protective function for the loads is no longer provided.

We recommend replacing the ÜSG with the fail-safe protection device SB 28 VF - 0 192 900 007 which has a longer delay time. The ÜSG and FSG (fail-safe protection device) are completely identical in terms of design; replacement could be effected for example within the framework of work performed for a general vehicle inspection or when overhauling the alternator. At the same time, malfunctions caused by ageing and corrosion are thus precluded.

In order to guarantee the protective function for loads, we therefore recommend replacing older units after 4 years of operation even if there are no apparent malfunctions.

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Technical After-Sales Service Department (KH/VKD 2)

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STACKING HEIGHTS, TRANSPORTATION REGULATIONS  
FOR FILLED AND CHARGED BATTERIES

Workshop: EL  
02.1988

0076 En

General

As regards the stacking heights and transportation regulations, no distinction is made between batteries which are maintenance-free as per DIN and batteries which are completely maintenance-free.

Stacking heights

Batteries up to 88 Ah	max. 4 layers
Batteries in excess of 88 Ah	max. 2 layers

This regulation does not apply to the use of battery pallets (so-called post pallets), since in this case the batteries are not stressed on stacking.

Stacking in-use wooden pallets one above the other is not permitted.

Transportation regulations for filled and  
charged batteries:

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Please pay attention to local regulations.

In cases of doubt, please contact your local BOSCH  
representative.

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Division KH  
Technical After-Sales Service Department (KH/VKD 2)

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ATTACHMENT-TYPE TRANSISTOR  
REGULATOR WITH BRUSH HOLDER 1 197 311 ..

Workshop: EL  
05.1988

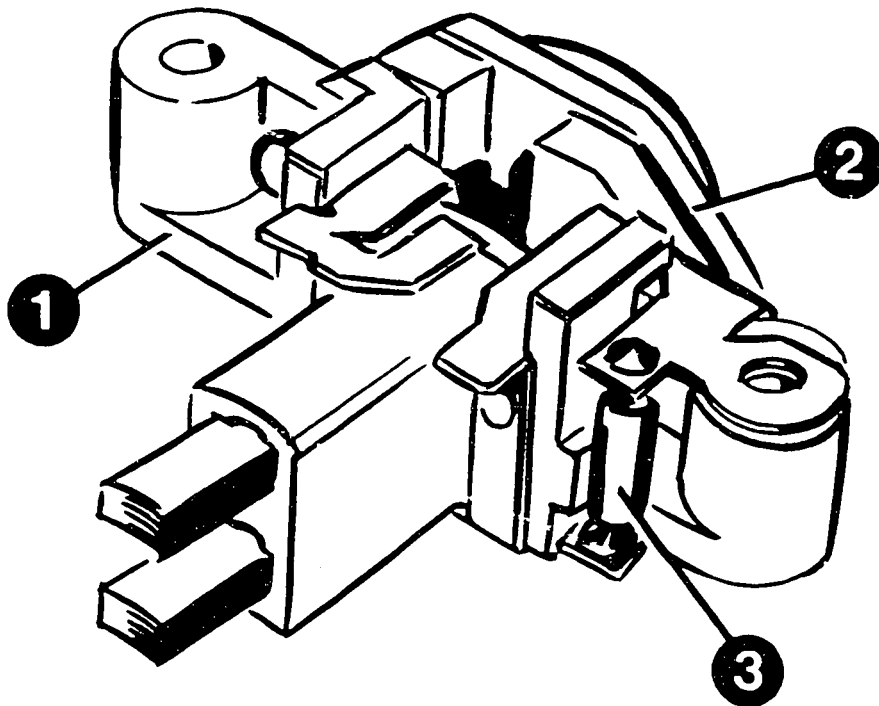
0097 En

The above component is a monolithic regulator  
(EL 14 V..).

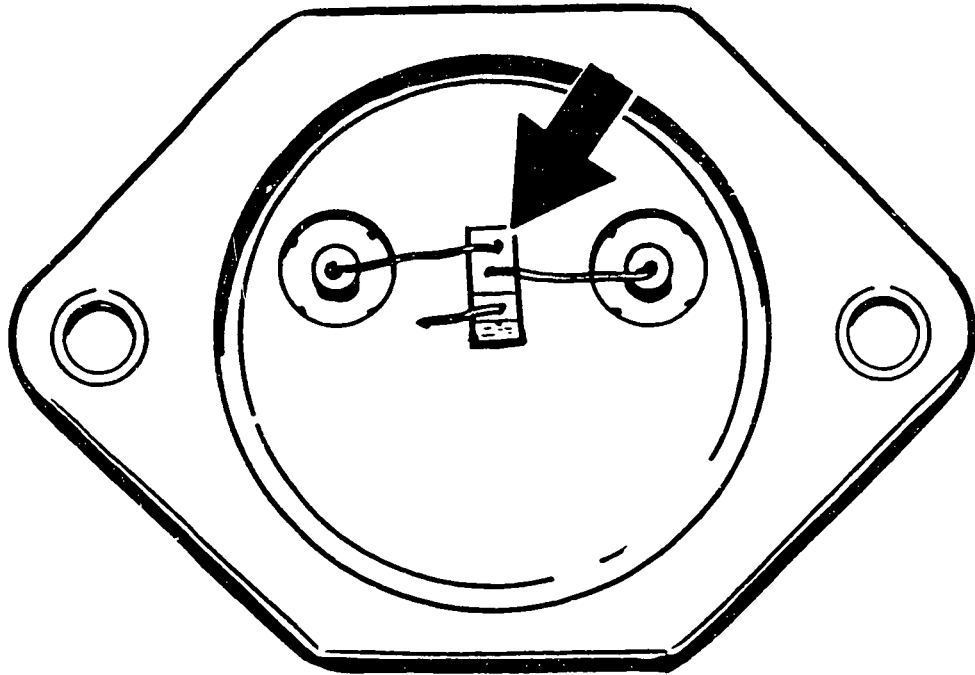
The special feature of the monolithic design is that the  
control, the power output stage and the freewheeling  
diode are all located on an integrated circuit (chip).

Regulator 1 197 311 .. (external view)

1 = brush holder    2 = regulator    3 = resistor (180 ohms)



192/240



192/241

Regulator 1 197 311 .. (interior view)

Arrow = integrated circuit (chip)

With the exception of its dielectric strength this regulator has the same basic characteristics as the hybrid regulator.

The regulator is envisaged for use in alternators with Zener power diodes and a rated voltage of 14 V for compact alternators up to max. 90 A (with restrictions, depending on vehicle electrical system, up to 110 A).

Some of the regulators feature a 180 ohm resistor on the brush holder between D+ and D-.

Interruptions in excitation are thus indicated.

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After-Sales Service Department for Training and Technology (KH/VSK)

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ALTERNATORS N1 - 0 120 469 ..

Workshop: EL  
07.1988

Rectifier

0116 En

The use of new, heavier-duty power diodes has made it possible with certain rectifier assemblies for N1 alternators to employ 8 power diodes instead of the previous 14. No changes have however been made to the heat sinks.

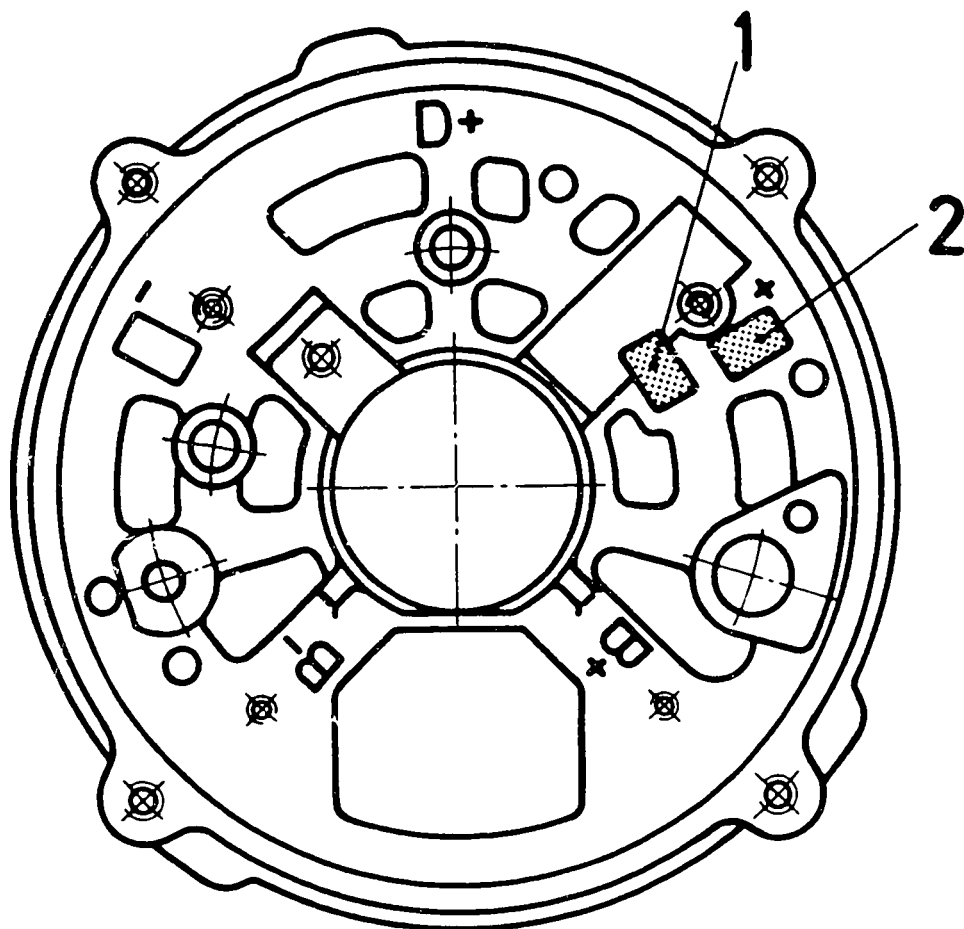
There are thus 3 unused diode interference fits per heat sink. This is not a manufacturing error.

---

Furthermore, the new rectifiers feature - for connection of an interference-suppressor box - a lug B+ which has been turned through 90° and moved outwards.

This necessitates having the opening at a different location in the collector-ring end shield.





- 1 = Opening for old rectifier
- 2 = Opening for new rectifier

Newer collector-ring end shields thus have 2 openings (refer to diagram). If a rectifier assembly has to be replaced, it is appropriate to likewise renew the old collector-ring end shield with a new one.

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Please direct questions and comments concerning the contents to our authorized representative in your country.

BOSCH starter batteries employing PbCa technology retain their start capability without being recharged for three times as long as conventional PbSb batteries.

The maximum permissible storage period for PbCa starter batteries is 18 months as of the date of manufacture for all versions.

In order to keep the storage period as short as possible, we suggest that you make consistent use of the first-in - first-out method, i.e. always start by supplying the oldest batteries.

Should a situation occur in exceptional circumstances where a battery remains in storage for 18 months, it should be recharged to ensure its start capability.

When recharging batteries, use may only be made of automatic battery chargers with IWU characteristic, e.g. BOSCH L 2412E or ML 1208E.

Recharging is to be effected in the switch setting "maintenance-free". Charging is complete when the charging voltage of 13.8 V has been constant for at least one hour.

Recharging does not extend the 18 month storage period; immediate sale to the final consumer is thus to be ensured.

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HYBRID REGULATOR EL 14/28 V  
Short-circuit to ground by way of metal air-intake cover

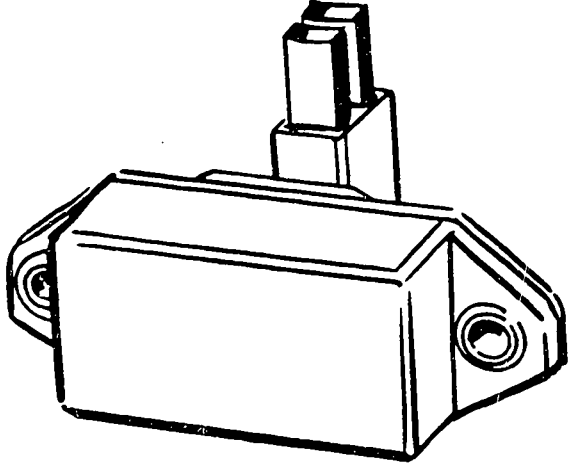
Workshop: EL  
08.1988

0118 En

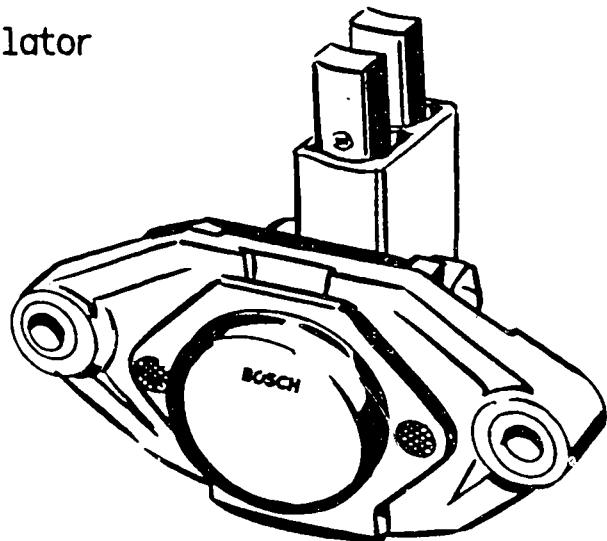
As original equipment, the EE-regulators 0 192 052 0.. /  
0 192 053 0.. etc were converted to the hybrid version  
EL 1 197 311 0.. / 1 197 311 3.. etc.

1 = EE-regulator

2 = EL-regulator

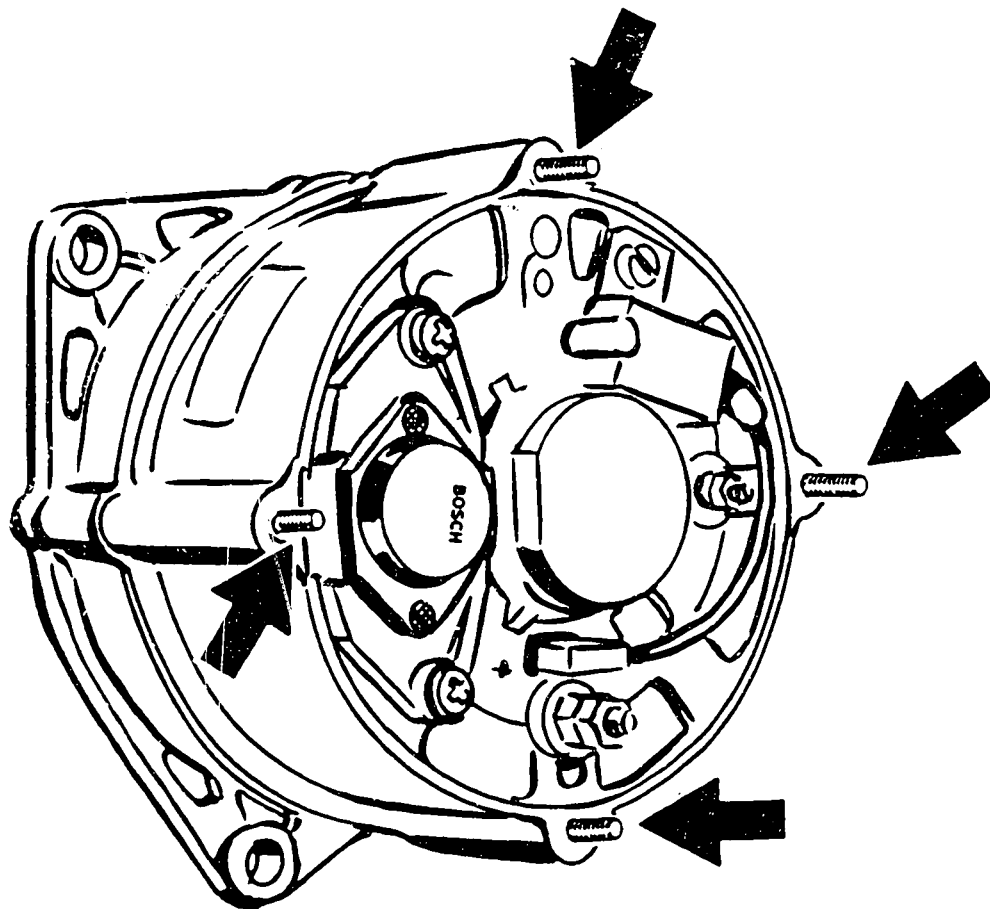


1



2

192 / 242



192 / 243

Alternator with protruding through bolts and EL-regulator

In the case of alternators with air-intake cover, there is no guarantee that the cover will not come into contact with the EL-regulator housing. With metal air-intake covers, e.g. BOSCH 1 125 500 015, the charging voltage of the alternator is no longer limited in the event of contact.

3 or 4 protruding M5 through bolts on the collector-ring end of the alternator (top picture - arrows) are a typical feature indicating that an air-intake cover can be attached.

When replacing regulators or the complete K1 alternator 0 120 48. ... or 0 986 03. ..., we would ask you to pay particular attention to the following so as to avoid subsequent damage:

- Either use an EE-regulator again,
- Or ensure that there is an air gap between the hybrid housing of the EL-regulator and the metal air-intake cover.

In cases of doubt, a plastic intake cover is to be employed. Such parts are being increasingly fitted by vehicle manufacturers.

Use can still be made of the plastic dust-protection cover (part number 1 120 522 009) for alternators with 4 through bolts and 127.5 mm hole-circle diameter. In this case, however, there is no possibility of attaching an air-intake hose.

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STARTING MOTOR 0 001 36. ... Type IF

Workshop: EL  
09.1988

WITH VANDERVELL BUSHING IN OVERRUNNING-CLUTCH DRIVE

0119 En

Some IF starting-motor versions feature a Vandervell bushing instead of the usual sintered-metal bushing. The Vandervell bushing is a metal bushing with diamond-shaped, graphite-filled indentations.

The bushing cannot be replaced in the event of repair, since it has to be calibrated with a special tool after being pressed in.

The bushing is thus not to be incorporated in the service-part delivery range. If the bushing is worn, the entire drive must be replaced.

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## 1. GENERAL

Bosch starter batteries are manufactured as both lead - antimony (PbSb) batteries and as lead - calcium (PbCa) batteries.

Bosch PbSb starter batteries are maintenance-free as per DIN 43539/2 and can be recognized from the white, transparent housing with plugs for opening and from the part no. 0 18... They are generally supplied as dry precharged batteries and are ready for use after filling.

Bosch PbCa starter batteries require absolutely no maintenance whatsoever and normally have a black housing. The part no. starts with 0 093 ... The batteries are supplied closed. They are filled with acid at the factory and are immediately ready for use.

## 2. MAINTENANCE

Maintenance-free batteries as per DIN have a low water consumption. The acid level should be checked for the first time after 25 months or 40 000 km and then once a year. If necessary, topping up should be effected with distilled or demineralized water.

Batteries which require no maintenance whatsoever have an extremely low water consumption. The electrolyte level only changes slightly during the service life of the battery given normal use. It is thus not necessary to check the electrolyte.

The batteries should only be opened in exceptional circumstances.

With both versions the mounting bracket and connections should be checked within the framework of vehicle servicing.

### 3. STORAGE

As a general rule, batteries should be stored as cool and dry as possible. The average storage temperature of + 20° C and relative humidity level of 75 % should not be exceeded.

If they are looked after properly, dry precharged batteries can be stored for at least 2 years. If the storage period is exceeded, the battery should be recharged after filling it with acid, so as to guarantee its starting performance. Please pay attention to safety precautions.

Batteries which are stored filled with acid have the advantage of immediate readiness for use. Special regulations apply to filled batteries, so as to ensure readiness for service:

PbSb batteries already filled with acid may not be stored for more than 6 months and are to be recharged every 3 months. They must have been installed in the vehicle at the latest 6 months after filling.

Given proper handling, the maximum storage period for PbCa batteries is 18 months as of the date of manufacture. The battery must then be installed in the vehicle. During this period the open-circuit voltage may drop to 12.2 V. In the event, for example, of excessively warm storage in sales-rooms, the open-circuit voltage may drop to the 12.2 V limit value before the end of the 18 month period. The battery is then to be recharged (see Section 4).

This does not extend the maximum storage period of 18 months.

Recharging is designed to maintain readiness for service and the full service life.



#### 4. CHARGING

If a starter battery has to be charged, the charging time and current intensity are a function of the charge, the size of the battery and the type of charger used. It is therefore advisable to employ a charger with IWU characteristic curve (e. g. Bosch L 2412 E, ML 1208 E or fast charger SL 2470 E). Other chargers can however also be used if it is ensured that the final charging voltage does not exceed 13.8 V in the case of PbCa batteries and 14.4 V in the case of PbSb batteries. A maximum application period of 10 hours should likewise not be exceeded. Overcharging leads to loss of electrolyte which can no longer be compensated for with closed batteries.

Note: Please note that with fast chargers the electronic regulation only takes effect after approximately 20 minutes. Never connect a fully charged battery to a fast charger (danger of overcharging)!

#### 5. FUNCTIONAL TEST AND WARRANTY TEST

The test methods differ depending on the battery size.

Batteries with a capacity of less than 27 Ah are loaded with the VA Tester ETT 011.00 (0 684 101 100).

Attention is to be paid to the Service Information "Motorcycle Battery Test (see Index Microcard W-001/000).

With warranty tests, the battery test report Rung 20002 (VDT-W-180/300-1 green) is additionally to be filled in \*.

Starter batteries with a capacity of between 27 Ah and 88 Ah are tested with the Bosch battery tester T 12 200 E as per the operating instructions. Setting in accordance with test current for low temperature. The acid assessment normally carried out to date can be dispensed with.

For warranty tests, the test report Rung 20001 (W-180/300-2 yellow) is additionally to be filled in \*.

Starter batteries with a capacity in excess of 88 Ah are tested using the Bosch battery tester T 12 600 E in accordance with the operating instructions. A digital voltmeter is to be connected in parallel.

The voltage is read off after 10 s and the rotary switch on the tester set to zero.

For warranty tests, the test report Rung 20002 (VDT-I-180/300-1 green) is additionally to be filled in \*.

The test procedure is described in VDT-I-180/300.

\* This applies only to Germany.

In all other countries:

Please consult your local Bosch representative.

## 6. FILLING DRY PRECHARGED PbSb BATTERIES

The acid and battery temperature should be at least + 10°C. Tilt battery slightly approximately 15 minutes after filling it and - if necessary - top up acid. The prescribed acid density is 1.285 kg/l for all climatic zones.

## 7. STACKING HEIGHTS FOR FILLED AND NON-FILLED BATTERIES

Stacking heights on wooden paletts or level surfaces:

Batteries up to 88 Ah	max. 4 layers
Batteries in excess of 88 Ah	max. 2 layers

Batteries, the terminals of which protrude over the height of the case, may only be stacked on top of one another if styropor is placed in between. Battery pallets (so-called Rung pallets) with a single layer of batteries may be stacked one above the other.

Loaded wooden pallets are not to be stacked one above the other.

## 8. DISPOSAL OF OLD BATTERIES

PbSb and PbCa batteries can be disposed of jointly. The same guidelines apply.

## 9. SAFETY PRECAUTIONS

An explosive mixture of hydrogen and oxygen (explosive gas) is generated when charging batteries. Compliance with the safety precautions is thus particularly important.

- Filled batteries may only be charged and stored in adequately ventilated rooms.
- Avoid sparks, particularly during the charging process and shortly afterwards, as well as when connecting and disconnecting leads.
- Smoking and naked flames are prohibited.

Pay attention to installation instructions!

Avoid short-circuits!

When disconnecting and connecting batteries in vehicles, make sure that no loads are switched on (sparks caused by sustained loads such as clock etc.). This also applies to vehicles with positive disconnection (coaches and in particular buses). The workshop switch is thus to be switched off if there is one. Trip or pull fuses of day loads which cannot be disconnected.

Always connect the positive terminal first and then the negative terminal (reverse order applies only to vehicles with positive connected to ground).

Proceed in reverse order when removing battery.

This precludes the possibility of sparks caused by inadvertent short-circuiting to ground during assembly.

The same applies to starting-aid procedures. Always make sure that the starting-aid leads are tightly connected to the terminals and that exclusive use is made of leads with insulated clips.

Always wear protective clothing and safety goggles when working with batteries, so as to guard against the caustic effect of battery acid. Should acid splash on to the skin or clothing, rinse it off immediately with copious amounts of water and neutralize with soda.

If acid gets into the eyes, rinse out immediately with copious amounts of water and then see a doctor.

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Division KH  
Technical After-Sales Service (KH/VKD 2)

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RAMMER IGNITER 0 203 400 001

Workshop: EL  
12.1987

Service-part orders

0145 En

In future, service parts for the rammer igniter 0 203 400 001 will only be available from

FHN - Verbindungstechnik GmbH  
Gewerbegebiet Ost 5  
8439 Postbauer-Heng  
G E R M A N Y

Telephone 09188 / 571  
Telex 624 523

\* After-sales-service workshops outside Germany:

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